REMARKS

Applicants confirm the species election of the mixture of SD-2 and SSD-9 spectral sensitizing dyes as shown in Table 1-1, Sample No. 101 (INV) on page 47 of the specification. This election is made without traverse.

Claims 1-16, with respect to the applied mixture species, have been rejected under 35 U.S.C. 103(a) as being unpatentable over the following references: Schwan et al (3,672,898); Sasaki et al (4,705,744); Sasaki (5,053,324); Nazawa (5,166,042); Ohtani et al (5,200,308); Ezaki et al(5,258,273); Ikegawa et al (5,308,748); Buitano et al (6,093,526); Sowinski et al (6,296,994); Heki (6,479,226); Shimba et al (EP 0 458 315); Ohashi et al (4,599,301); Sato et al (6,656,670) and Nagaoka et al (6,740,481). Applicants respectfully traverse these rejections.

The Examiner generally states that each of the reference discloses, teaches and suggests a silver halide color photographic material comprising a support having thereon at least three blue-, green- and red-sensitive units with each unit comprising at least one sensitive emulsion layer, wherein at least one green sensitive emulsion layer contains at least two different and distinct spectral sensitizing dyes and their amounts to give two peaks. As will be discussed in detail below, while the various references may show the use of two green sensitizing dyes, they do not disclose or teach the use of two peaks as required by the current invention.

The intent and advantage of Applicants' invention is to improve the ability of color negative camera film to reproduce natural colors under artificial illuminants, particularly common fluorescent lights. Figure 1 below shows the output of light vs. wavelength for common fluorescent lighting tubes. All of these tubes produce light through excitation of mercury vapor. The excited mercury atoms emit light at specific wavelengths, 435.8 nm and 546.1 nm. Light in the red region of the spectrum is provided by the phosphors coated on the inside of the tube. Different phosphors are used to produce the various colored tubes: Cool White, Cool White Deluxe, Warm White, Warm White Deluxe. Most color negative films have maximum sensitivity to light in the red, green, and blue layers around 470nm, 545nm, and 650nm, respectively. Therefore, only the green recording layer of the film has a strong overlap with the green emission line

of the fluorescent lights. This mismatch results in photographs taken under fluorescent illumination being overexposed in green and causes an undesirable greenish cast in the print.

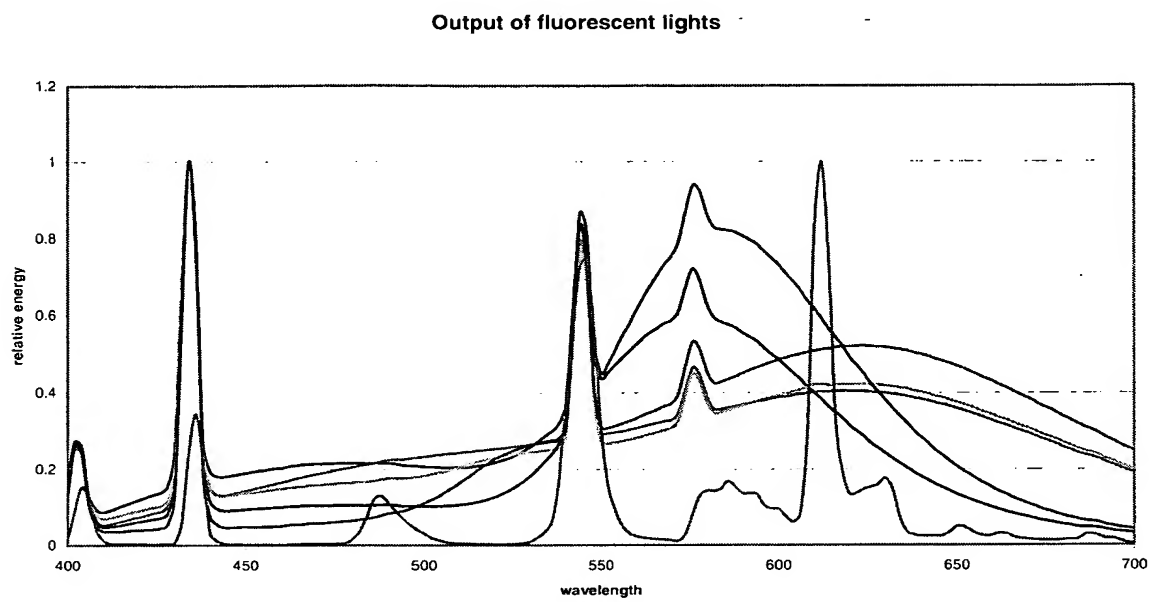

Figure 1. Output of common fluorescent lights.

Previous improvements have attempted to improve the sensitivity to fluorescent lights by moving the blue and/or red sensitivity of the film to shorter wavelengths in order to capture more of the blue and red light being emitted by the fluorescent lights. Other approaches are aimed at making the film sensitivity more closely resemble that of the human eye, thus improving overall color capture accuracy and illuminant sensitivity at the same time. However, a film with truly eye-like sensitivity must necessarily have a high degree of overlap between the green sensitive and red sensitive layers, just like the human eye does. A film of this type is less efficient in its use of light because of the filtering effect of the green layer on the red layer, and color reproduction in the print must be corrected digitally since the high level of chemical color correction necessary within the film is unachievable.

The current invention takes a different approach to this problem. It corrects for green fluorescent light overexposure by reducing the amount of green light recorded at 546 nm, but maintaining the overall absorption of green light for daylight and flash exposures. This is accomplished by creating a green-recording layer sensitivity that has two peaks, one at a wavelength shorter than the mercury

emission line and one at a wavelength longer than the mercury emission line with a significant "hole" at 546 nm.

Spectral sensitivity is the response of the photographic emulsion or film coating to light at each wavelength of the visible spectrum (400-700 nm). Spectral sensitization is the art of adding light absorbing dyes to chemically sensitized silver halide emulsions such that the dyes adsorb or aggregate on the surface of the emulsion and are able to absorb photons of light and transfer electrons to the conduction band of the silver halide. For many applications, J-aggregating dyes are preferred because the J-aggregate form of the dye has a high extinction coefficient and narrow absorption band. This property allows one to direct the absorption of specific ranges of wavelengths while excluding or minimizing other wavelengths. However, the exact absorption of a sensitizing dye when it aggregates is very difficult to predict. It depends on the exact geometry of the individual dyes in the aggregate structure and on the substrate on which the dye may be adsorbed. The spectral envelope of absorbed light for a J-aggregating dye on silver halide also depends on the manor in which the dye is added to the emulsion, the temperature, rate of addition, solvent, agitation, etc.

When two dyes are used, it does not mean that two absorption peaks are produced. If more than one dye is added to the emulsion, the dyes may interact with each other and form a mixed aggregate that is different from that achieved by each dye individually. In addition to all of the factors that influence the aggregation of a single dye, the aggregation for two dyes will also depend on the order and rate of addition and on the relative amounts of the two dyes. For these reasons it can be quite difficult to use combinations of sensitizing dyes in spectral sensitization to achieve a specific desired spectral sensitivity. Frequently the mixed aggregate will produce a single absorption peak that is intermediate between that of the individual dyes. An example of this is shown in Figure 2 below. This figure shows the spectrum of the J-aggregate absorption for two dyes on AgBr along with the spectrum of a 50/50 blend of the two dyes. The short wavelength peak (525 nm) is for the dye shown in the figure. The long wavelength peak (545 nm) is for dye SD-5 in Sowinski '994. The peak at 533 nm is the 50/50 mixture. Further information and explanation of the behavior and manipulation of dye blends is included in *"Spectral Sensitization of Emulsions for Improved Color Reproduction and Reduced Illuminant Sensitivity of Color*

Negative Films," Proceedings of the International Congress of Photographic Science, 1998, Track 1, Nanostructured Materials for Imaging, page 219-222. A copy is attached.

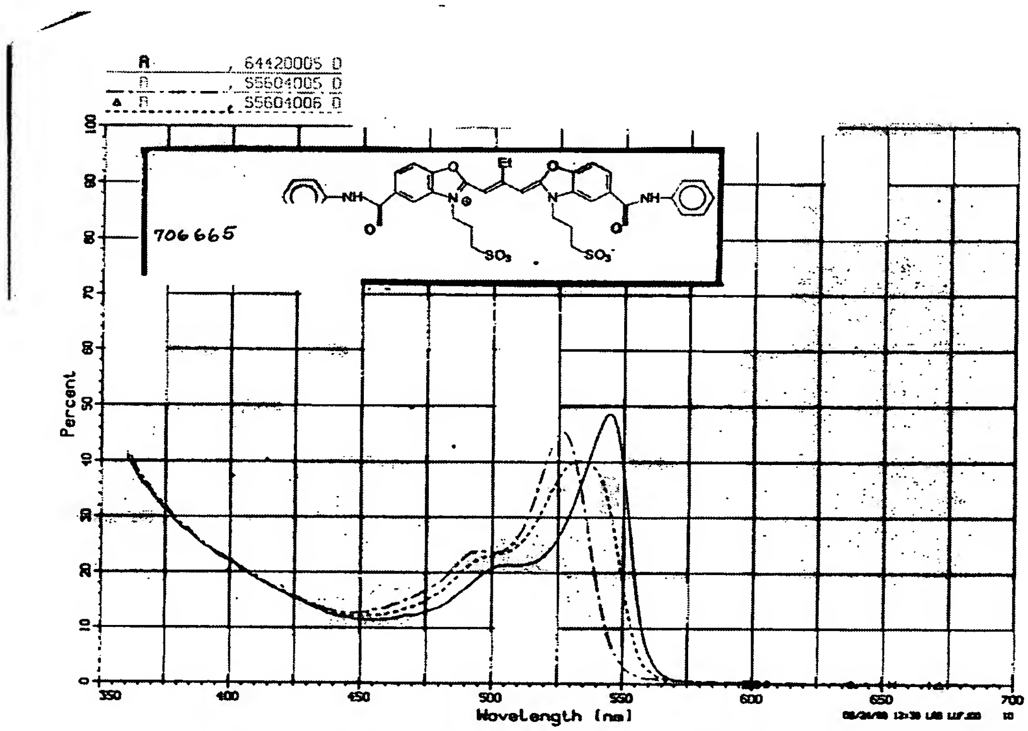

Figure 2. Spectra of two individual J-aggregating dyes on AgBr along with a 50/50 blend. Note that the blend does not form two peaks, but one smooth peak at an intermediate wavelength.

Previous inventors have used mixed aggregates (blends of two or more dyes) to create smooth broad absorption profiles for various applications including accurate color recording. Because the eye's maximum sensitivity to green light is at 545 nm, film spectral sensitivities have featured smooth absorption profiles centered at 545 nm. However, this is the same wavelength where fluorescent lights emit and cause the greenish cast in photographs taken under fluorescent illumination. The current invention, after much experimentation, is the use of certain types of dyes to achieve a new spectral sensitization with a specific shape designed to decrease the undesirable green color shift in photographs taken under fluorescent illumination. Other inventors have not yet recognized the need to narrowly define the spectral sensitization required to achieve this benefit. Instead of a smooth spectral sensitivity profile with a peak near 545 nm, Applicants have devised a blend of dyes that when added properly to the emulsion, produce a spectral sensitivity with two peaks and

a distinct minimum near 545 nm. Thus the current invention, the spectral sensitivity profile of the green sensitive emulsions, is different from the references cited by the Examiner, even though some of the dyes used may be the same.

As noted above, none of the references, either alone or in combination, disclose, describe or suggest a silver halide element having the spectral sensitivity profile of the current invention. Dr. Steven G. Link, in the accompanying Declaration, has described in detail why each of the above references does not make the current invention obvious.

In light of the above remarks and the accompanying declaration, Applicants respectfully request that the claims be allowed.

Respectfully submitted,

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If the Examiner is unable to reach the Applicant(s) Attorney at the telephone number provided, the Examiner is requested to communicate with Eastman Kodak Company Patent Operations at (585) 477-4656.